DETAILED ACTION

Response to Amendment

The amendment filed 2/15/2008 is noted. Claims 14-20 are added. Claim 2 is cancelled.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-10, 12-17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meacher et al. (US 5,858,569) in view of Hiroshi et al. (JP 11-339,828) OR unpatentable over Hiroshi et al. (JP 11-339,828) in view of Meacher et al. (US 5,858,569), and further in view of Yoshimura et al. (US 6,291,094.)

Meacher et al. (US 5,858,569) teaches a separator for a fuel cell comprising a metal plate including a carbon coated gas passage portion and a peripheral foil contact portion in a part other than the gas passage portion, wherein the carbon-coated surface treatment applied to the gas passage portion is different from a surface treatment applied to the contact portion. The untreated frame/stainless steel section is a contact portion other than the gas passage portion and also may serve as an attachment portion (see col. 5, line 20- col. 6, line 13.) The individual fuel cells are electrically connected in the stack and clamped. A gasket frame portion is noted on the surface of the peripheral foil contact portion (cols. 5-6, figure 6.) The cells are connected with

good electrical contact throughout the stack while insulating individual anode and cathode contacts of the stack (col. 1, line 40 to col. 2, line 4.) Meacher et al. (US 5,858,569) does not teach the contact portion being brought into contact with a terminal of a cell voltage monitor attached to the fuel cell or that the anti-corrosion surface treatment on the gas passage portion includes a metal plating and a carbon coat formed on the metal plating, and an anti-corrosion surface treatment on the contact portion is the metal plating being brought into contact with the terminal of the cell voltage monitor directly.

Hiroshi et al. (JP 11-339, 828) teaches a fuel cell stack with a voltage-measuring terminal attached to the sidewall of the separator plate. The fuel cell separator plates have a protruding terminal integral with the separator for measuring the voltage of each cell in the fuel cell stack. The separator may be graphite, aluminum and stainless steel (paragraph 28.) The terminal is engaged with a voltage monitor (paragraphs 12-29.) The attachment portion is attached in the direction wherein a plurality of frames are stacked as taught in figure 1. The references teach gas manifold portions outside of the gas passages (for example, see figures 3-4 of '828.) The contact portion is provided on an edge of the separator that extends in a longitudinal direction of a rectangular gas manifold opening (figures 3-5.) Parallel grooves are formed in the separator (see figures 3-4, grooves adjacent to manifolds 11 and 13.) Hiroshi et al. (JP 11-339,828) does not teach the metal separator plate is coated with a carbon layer in the area of gas flow along the separator plate.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to attach a terminal in the manner taught by Hiroshi et al. (JP 11-339,828) to the frame portion of the separator plate of Meacher et al. (US 5,858,569) in order to measure the voltage of

each cell in the fuel cell stack as taught by Hiroshi et al. (JP 11-339,828.) The attachment portion may be attached to the stainless steel frame by soldering or welding as taught by Hiroshi et al. (JP 11-339,828.) As the outer surface of the plate is not coated, it would be accessible to the exterior measuring device. Further, the skilled artesian would understand that the welding of the metal lead to the metal plate would provide a secure weld as compared with the carbon coating. Coating the attachment portion with a gasket will allow for the sealing of the fuel cells which prevents fuel, oxidant and water leakage from the fuel cell. The gasket serves as an anti-corrosion surface treatment on the peripheral foil portion.

Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to coat the gas flow portion of the separator plate taught by Hiroshi et al. (JP 11-339,828) with the carbon layer of material on of the separator plate of Meacher et al. (US 5,858,569) in order to flow gas through grooves and form an electrically conductive path for current generated in the groove regions of the cell to flow laterally to areas where the contacting portions of the separator plates. It would further be obvious to one of ordinary skill in the art at the time the invention was made to apply a conductive coating, such as graphite, to the stainless steel plate in order to allow for gas flow and electrical conduction. Hiroshi et al. (JP 11-339,828) teaches the plate may be of aluminum or stainless steel. For example, one of ordinary skill in the art would be motivated to coat the stainless steel plate with an aluminum coating as Hiroshi et al. (JP 11-339,828) teaches aluminum as a conductive separator material that forms a bond with a protruding terminal. Further, the contact faces between adjacent separators can be provided with sufficiently high electronic conductivity and the internal resistance of the cell can be reduced to increase the output voltage of the fuel cell (as evidenced by US 6,291,094.)

The references do not teach that the anti-corrosion surface treatment on the gas passage portion includes a metal plating and a carbon coat formed on the metal plating, and an anti-corrosion surface treatment on the contact portion is the metal plating being brought into contact with the terminal of the cell voltage monitor directly.

Yoshimura et al. (US 6,291,094), however, teaches a fuel cell comprising a grooved metal plate including a first metal coating and a second carbon coating on a gas passage portion and a contact portion in a part other than the gas passage portion, wherein the surface treatment is applied to the entire gas passage portion (see the claims, figures 4 and 8-11, and the corresponding text found in at least col. 6, lines 6-end and col. 7, line 30 to col. 8, line 65.) The terminal is arranged so that the positive terminal is arranged on a first end surface of the separator on a cathode side and a negative term terminal al is arranged on a third end surface of the separator on an anode side. The separator includes a metal such as stainless steel, coated with a protective, conductive layer followed by a coating of carbon (cols. 6-8.) The carbon may be selectively added to the gas passage areas (see col. 14.) The frame/stainless steel section is a contact portion other than the gas passage portion and also serves as an attachment portion. The metal plate includes a gas passage area.

With regard to claim 13, the references teach gas manifold portions outside of the gas passages (for example, see figures 3-4 of '828 and figure 2 of '094.) The gas passages are located proximate to the corner of the separator. Hiroshi teaches a contact portion proximate to the corner on a face of the separator (figures 3 and 5, p. 30.) If the location is not considered proximate to the corner, then it would have been obvious to one of ordinary skill in the art at the time the invention was made to attach the monitor at any position along the separator that

provides reliable mating. As the surface of the separator is conductive, the terminal will function to conduct regardless of the location.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form anti-corrosion surface treatment on the gas passage portion includes a metal plating and a carbon coat formed on the metal plating as taught in Yoshimura et al. (US 6,291,094.) The coatings will provide corrosion resistance and high conductivity for the transfer of electrons in a fuel cell (for example, see col. 7, lines 30-end.) Further, it would be obvious to one of ordinary skill in the art to include different anti-corrosion materials on the different surfaces of the separator plate in order to achieve desired properties of the plate, such as anti-corrosion and/or high conductivity. The references teach adding an anti-corrosion layer to prevent passivation of the separator (see Yoshimura, as noted), to give improved conductivity (graphite) and to promote sealing and conduction between fuel cell components. One of ordinary skill in the art would understand to add each of these materials to give the desired effect taught in the reference. For example, adding graphite on the interior of the separator gives improved conduction, as taught in Meacher, and using a polymer gasket on the edge surface of the plate seals the edges of the cell and protects the plate. Further, it would have been obvious to the skilled artesian to form a metal-plated anti-corrosion surface treatment on the contact portion brought into contact with the terminal of the cell voltage monitor directly in order to protect the connection portion from corrosion. For example Yoshimura teaches that highly conductive metals may be used to optimize conduction (col. 8, lines 30-65,) but these materials are also easily oxidized wherein the material will have essentially no conductivity. Therefore, a coating metal is added that has good conductivity when oxidized to prevent oxidation of the core metal.

From these teachings, it would be obvious to use a highly conductive material as a terminal on the fuel cell plate and to coat the material with a protective coating to retain the conductive features of the terminal. Further, it would be obvious to coat all metal portions that are exposed and reactive to corrosive agents including manifolds and gas flow channels. However, since the terminal is taught to be attached to the plate by welding and the like, it would be obvious to the skilled artesian to exclude a carbon coating from the section that has the terminal engaged with the separator in order to provide a secure attachment. The contact resistance of the contact portion and the corrosion resistance of the gas passage portion would therefore be stabilized. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Allowable Subject Matter

Claims 18 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The teachings of the prior art have been presented. The prior art does not teach an apparatus comprising a separator for a fuel cell and a terminal of a cell voltage monitor, as claimed, including the features that first and second grooves are formed in the frame portion of the plate and the first groove is separately formed in parallel with the second groove, wherein one of the positive side metal plate and the negative side metal plate has a groove with a position and configuration corresponding to only the first groove, the other of the positive side metal plate

and the negative side metal plate has a groove across the first and second grooves, and the terminal of the cell voltage monitor is brought into contact with the non-coated contact portion of the one of the positive side metal plate and the negative side metal plate.

Response to Arguments

Applicant's arguments, filed 2/15/2008, with respect to the amended claims have been fully considered, but are not persuasive.

Applicant submits that the Office Action does not address the feature of claim 13 that reads, "the contact portion being located proximate to the comer of the separator." Since claim 13 was amended to include the cited language in a response following the office action, it was not possible to address the unwritten feature at that time. The amended limitation has been addressed in this office action.

The Applicant respectfully submits that claim 1 is patentable over the cited references at least because it recites, "a separator for a fuel cell comprising a metal plate including a coated gas passage portion and a non-coated contact portion, the non-coated contact portion being located further to the side of a periphery of the metal plate than the gas passage portion, a conductive surface of the contact portion being exposed" and "wherein an anti-corrosion surface treatment on the gas passage portion includes a metal plating and a carbon coat formed on the metal plating, and an anti-corrosion surface treatment on the contact portion is the metal plating being brought into contact with the terminal of the cell voltage monitor so that contact resistance of the contact portion and the corrosion resistance of the gas passage portion are stabilized."

The Applicant further argues that Yoshimura may describe various combinations of materials that are applied on the metal plate; however, in contrast to certain embodiments of the present invention, the cited references do not disclose a metal plate including both a coated gas passage portion and a non-coated contact portion as recited in Applicant's claims 1.

This argument is not persuasive. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Meacher et al. (US 5,858,569) teaches a separator for a fuel cell comprising a metal plate including a carbon coated gas passage portion and a peripheral foil contact portion in a part other than the gas passage portion, wherein the carbon-coated surface treatment applied to the gas passage portion is different from a surface treatment applied to the contact portion. The untreated frame/stainless steel section is a contact portion other than the gas passage portion and also may serve as an attachment portion. Hiroshi et al. (JP 11-339, 828) teaches a fuel cell stack with a voltage-measuring terminal attached to the sidewall of the separator plate. No surface treatment applied to the contact portion. Thus, the references teach attaching a terminal to an uncoated plate by welding and the like and forming a coated gas passage portion only where gas flow occurs. The Yoshimura reference is cited for teaching a corrosion resistant metal-made gas separator comprising a metal plate completely coated with a first coating layer and a second coating layer of graphite. The coatings protect the plate by achieving a sufficiently high corrosion resistance (col. 7.) Separator sections not exposed to oxidizing gasses do not need to be coated (col. 6, lines 40-45; col. 14, lines 17-45.) From this, one skilled in the art would be

motivated to coat regions exposed to corrosive gasses with such a material, while allowing for the region that has a welded surface to be free of the material that inhibits a firm weld.

Moreover, the Applicant respectfully submits that function of the material (in particular, carbon or graphite) in certain embodiments of the present invention is completely different from that described in Yoshimura; therefore, because the objectives are completely different, it would not have been obvious to combine the cited references as alleged nor in a manner as recited in Applicant's claim 1. This argument is not persuasive.

One skilled in the art would be motivated to use the coating taught in the Yoshimura reference in the other references cited to give an inexpensive and corrosion resistant metal gas separator. The coatings protect the plate by achieving a sufficiently high corrosion resistance (col. 7.) The carbon coating is used for gas diffusion in a manner equivalent to that of Meacher (col. 2, lines 15-25.) The resistance of the plate is improved by preventing the corrosion of material that forms a passivating layer. The coatings will provide corrosion resistance and high conductivity for the transfer of electrons in a fuel cell (for example, see col. 7, lines 30-end.) Further, sections not exposed to oxidizing gasses do not need to be coated (col. 6, lines 40-45; col. 14, lines 17-45.) From the teachings cited in the rejection, it would be obvious to use a highly conductive material as a terminal on the fuel cell plate and to coat the material with a protective coating to retain the conductive features of the terminal. Such a coating will stabilize the contact and corrosion resistance of the separator plates taught in Meacher and Hiroshi when exposed to a fuel cell environment. However, since the terminal is taught to be attached to the plate by welding and the like, it would have been obvious to the skilled artesian to exclude a coating from the section that has the terminal engaged with the separator in order to provide a

secure attachment. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

/Mark Ruthkosky/

Primary Examiner, Art Unit 1795